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Address delivered by the Astronomer Royal, President of the Society, on presenting the Honorary Medal of the Society to Dr. Annibale de Gasparis.

It is now my duty, Gentlemen, to announce to you that the Council have awarded the Medal of the Society to Signor Annibal de Gasparis, for the discovery of the three planets, *Hygeia*, *Parthenope*, and *Egeria*. The nature of these discoveries scarcely allows of any very elaborate commentary, yet perhaps a few remarks upon the methods by which these and other planets have been found may not be misplaced on the present occasion.

Seventy years since, the only planets known to men of science were the same which were known to Chaldean shepherds thousands of years ago. The "five other wandering orbs" of Milton, whose number Kepler once conceived to be fixed by the immutable laws of necessity, were still the only recognised wanderers in the sky. Although the notion of a fatality in the precise number had doubtless passed away, yet the impression produced on men's minds by the unbroken recognition through many ages of five and only five planets, possessed nearly the same force. The discovery of a new veritable planet seems to have given rise to the same kind of emotions as would be produced now if we found a class of animals possessing a new kind of sense; as a perception of magnetism, of photogenic

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radiation, or of polarization. This discovery was made by the elder Herschel; and it was truly the fruit of accident, occurring in the course of sidereal researches, in which the discovery of planets does not appear to have been contemplated. Let me not, however, be understood as disparaging from the claims of Herschel to the fame which he acquired. Another person might have seen the new star; but scarcely another person would have instantly remarked its peculiarity of appearance, would have interrupted his sweep in order to follow it, and would have immediately determined its place so well as to be able in a short time to see that it was a moving body. Acute senses, rapid judgment, and prompt action, were necessary; and they were successful. And the innovation thus made in the subjects of thought for the speculative astronomer appears to me the greatest that had been made since the establishment, among men of science, of the doctrine of the movement of the earth.

The spell was now broken; and the accidental discovery of another planet (*Ceres*) at the beginning of the present century, excited therefore little emotion on the mere ground of the discovery of a new planet. But it was interesting on another ground; that the position of the new planet, in respect of distance from the sun, corresponded well with an empirical law, which was generally founded on the known distances of the other planets, but which required for its completeness the interposition of another planet at the newly-found distance. This interest was increased when, upon examination of stars seen near to *Ceres*, it was discovered that one of these was moveable, and that it was also a planet (*Pallas*), with mean distance from the sun differing very little from that of *Ceres*. The idea was promulgated that these two might be fragments of one great planet, and that possibly other fragments of the same planet might be found; and it was reasonably inferred that if these fragments had been formed by one great explosion, the orbit of every one of the fragments must (except as affected by perturbations) continue to pass through the point of explosion; and, therefore, if we noted in the heavens the point of intersection of the orbits of *Ceres* and *Pallas*, and kept up a constant watch on the neighbourhood of that point, we must infallibly discover all the other fragments. That limited tract of the sky was like a pass in a mountain-chain; however much the travellers might wander over the plain in their approach to it, they must necessarily all traverse that narrow gate; and *there* was the place where a detective police might be stationed with a good chance of arresting suspicious vagrants. And now the process for the discovery of planets assumed a new and a systematic form. A confederation of German astronomers, mainly under the direction of the celebrated Olbers, undertook and maintained for many years a regular watch of the portions of the heavens indicated as the planet-portals. *Juno* and *Vesta* were thus discovered. And so steadily did Olbers keep up his examination, that he was at last able to assert that no other new planet had passed the guarded

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space from 1808 to 1816. This assertion must, of course, be understood as limited by the powers of the telescope which he used, and which was much inferior to those employed in more modern researches.

It was, apparently, amid the reflections naturally suggested by the arduous labours of these still somewhat isolated inquiries, that the idea of more completely examining and recording the appearance of the heavens at a definite time grew up. On 1825, Nov. 1, the Berlin Academy issued its celebrated invitation to astronomers, to co-operate in forming maps of the heavens within certain limits of declination. The probability of finding planets by this means was distinctly pointed out in that document. The response to the invitation has been very satisfactory, though even yet not perfectly complete; and it is impossible to overrate the effect which it has had in promoting the discovery of planets. This it has done, not simply by the direct use of these charts for comparison with the heavens, although the first planets of Hencke, Hind, and De Gasparis, as well as another to which I shall shortly allude, were thus discovered; but also by the stimulus which they have given, and the example which they have afforded, for the formation of other more accurate charts (for the most part unpublished), such as those by which the later planets of Hind and De Gasparis, and that of Graham, were found.

In the meantime another planet was found, under circumstances probably the most extraordinary that have ever presented themselves in the history of science. It is not my intention here to enter upon the details of the discovery of *Neptune*; but there is one circumstance connected with it, related to the matter of which I have just spoken, to which I may properly allude. It will at least serve to show how strongly I have felt the disadvantage of not possessing charts like the Berlin maps, and how vividly others have experienced the satisfaction of having them at hand in the time of need. It may be in the recollection of some persons, who have read the contribution to the history of that discovery which I communicated to this Society, that when an approximate place had been indicated for *Neptune* by the theoretical investigations of Adams and Le Verrier, I took the liberty of urging on my friend Professor Challis the probable advantage of examining a certain tract of the heavens, and I at the same time offered some suggestions as to the way of making the examination. In these I distinctly pointed out that the Berlin maps applying to the tract in question were not completed, that only a small corner of one of them was available, and that it was necessary to contemplate the very serious labour of two or three complete examinations. But at Berlin the state of preparations was different. The chart relating to the Neptunian region was just completed by a German astronomer; I am not quite certain whether the proof or one of the earliest printed copies was in the hands of Dr. Galle: a very rapid glance on each part sufficed to show whether any new object had or had not crept into that tract; and a discovery was made with

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the assistance of the chart in a few minutes which, without it, might have employed months.

It thus appears that planets have been discovered in three different ways: by accident, by examination of the heavens, as suggested by the investigations of physical astronomy, and by systematic comparison of the visible state of the heavens with the state as recorded in charts. But the number of discoveries made in the different ways is very different: three in the first, one in the second, and eleven in the third. We are justified thus in asserting that there is one method which is peculiarly the proper one for the search for planets; and the employment or non-employment of this method must in some measure affect our estimation of the judgment exhibited by the person who is engaged in the search.

The three planets of Signor de Gasparis were all discovered in this way: the first (*Hygeia*) on 1849, April 12, by comparison with the Berlin maps; the second (*Parthenope*) on 1850, May 11, it is believed in the same manner; the third (*Egeria*) on 1850, November 2, by comparison with the ecliptic charts constructed by Signor de Gasparis from his own observations.

Let me now for a moment invite your attention to the importance of these discoveries. And this, perhaps, can best be illustrated by analogy. When the young naturalist enters first upon extensive examination, not only of the genera and species, but also of the habitats of animals, nothing is more striking to him than to find that life, implying also organisation and order, in some form or other abounds everywhere. The discoveries of astronomy lead us to a similar conclusion. The fields occupied by the specific subjects of discovery are broader, the exploration of their individual characteristics is less accurate; but the same general impression rises on us, that planetary life, so to speak, abounds everywhere. Where, fifty years ago, not a single planet was known to exist, a group of thirteen is now recognised. Of their organisation we can yet say nothing, but of the order with which they follow the laws of motion, inferred from the investigation of the older planets' motions, we have positive assurance. And no one, who remarks how more extended discoveries have followed more improved means of observation, can resist the belief that as we still go on improving our instruments we shall still go on finding more planets, till space, in our solar system at least, may appear, in reference to what was formerly known, comparatively full of these travelling bodies.

I am sure, Gentlemen, that your hearty approval will accompany your Council's award of the Society's Medal for labours judiciously and successfully directed in a course of researches on such an important object. And I trust that our award will be acceptable to Signor de Gasparis, as an evidence that we are not slow in learning and not ungenerous in estimating the efforts of a foreigner in promoting the science which we call peculiarly ours. There is another circumstance which I hope will increase his gratification. The testimony of the Society's respect will be delivered by one of

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its officers, who has himself laboured in the same cause and with similar success. And the publication of our adjudication, and of the instrumentality by which we carry it into execution, will serve to convince the world, if conviction were necessary, that neither national nor personal rivalry disturbs the appreciation of labours ably directed to a worthy object.

(*The President, addressing himself to Mr. Hind, Foreign Secretary of the Society, as proxy for Signor de Gasparis, continued as follows*) :—

I request you to deliver this Medal, in the name of the Society, to Signor de Gasparis; to express to him the respect entertained in this country, and by none more than by yourself, for his labour, his judgment, and his success; and to convey to him our wishes for the continuance and increase of his reputation in the science to which he has so ardently devoted himself.